CLAIMS:

1. An isolated polypeptide selected from the group consisting of:
    a) a polypeptide comprising a span of at least ten amino acids of amino acids 589 to 643 of SEQ ID NO: 2;
    b) a polypeptide comprising amino acids 589 to 643 of SEQ ID NO: 2;
    c) a polypeptide comprising amino acids 545 to 643 of SEQ ID NO: 2;
    d) a polypeptide comprising SEQ ID NO: 2;
    e) a polypeptide comprising SEQ ID NO: 4;
    f) a polypeptide comprising SEQ ID NO: 6;
    g) a mutein of any of (a) to (f), wherein the amino acid sequence has at least 50 % or 60 % or 70 % or 80 % or 90 % or 95% or 99% identity to at least one of the sequences in (a) to (f);
    h) a mutein of any of (a) to (f) which is encoded by a DNA sequence which hybridizes to the complement of the DNA sequence encoding any of (a) to (f) under moderately stringent conditions or under highly stringent conditions; and
    i) a mutein of any of (a) to (f) wherein any changes in the amino acid sequence are conservative amino acid substitutions to the amino acid sequences in (a) to (f).
2. The polypeptide of claim 1, wherein said polypeptide is capable of binding to the Bγ subunit of the PP2A phosphatase.
3. A potassium channel comprising at least one polypeptide of claims 1 or 2.
4. The potassium channel of claim 3, wherein said potassium channel is a homomeric channel comprised of polypeptides of claims 1 or 2.
5. A purified polynucleotide encoding the polypeptide of claims 1 or 2, or a polynucleotide complementary thereto.
6. The polynucleotide of claim 5, wherein said polynucleotide is selected from the group consisting of:
    a) a polynucleotide comprising nucleotides 1776 to 1929 of SEQ ID NO: 2.
    b) a polynucleotide comprising nucleotides 1632 to 1929 of SEQ ID NO: 2.
    c) a polynucleotide comprising SEQ ID NO: 1 ,
    d) a polynucleotide comprising SEQ ID NO: 3 ,
    e) a polynucleotide comprising SEQ ID NO: 5 ,
    f) a polynucleotide complementary to the polynucleotides of (a) to (e).

7. An expression vector comprising the polynucleotide of claims 5 or 6.

8. The expression vector of claim 7, wherein said vector is a gene therapy vector.

9. A host cell comprising the expression vector of claims 7 or 8.

10. A method of making a polypeptide, said method comprising the steps of culturing a host cell according to claim 9 under conditions suitable for the production of a polypeptide of claim 1 or 2 within said host cell.

11. The method of claim 10, further comprising the step of purifying said polypeptide from the culture.

12. An antibody that specifically binds to a polypeptide of claim 1 or 2.

13. Use of a KCNQ2 polypeptide as a target for screening candidate modulators.

14. The use of claim 13, wherein said candidate modulator is selected from the group consisting of a natural ligand, a small molecule, an aptamer, an antisense mRNA a small interference RNA and an antibody.

15. The use of claims 13 or 14, wherein said modulator is a candidate d rug for the treatment of a mental disorder.

16. The use of any of claims 13 to 15, wherein the activity of said KCNQ2 polypeptide is assessed by measuring the M-current generated by a potassium channel comprising said KCNQ2 polypeptide.

17. Use of a modulator of a KCNQ2 polypeptide for preparing a medicament for the treatment of a mental disorder.

18. The use of claim 17, wherein said modulator is used in combination with a known drug for said treatment of said mental disorder.

19. The use of any of claims 13 to 18, wherei n said KCNQ2 polypeptide is a polypeptide of claims 1 or 2.

20. The use of any of claims 13 to 19, wherein said modulator specifically modulates a polypeptide comprising exon 15b shown at position 545 to 643 of SEQ ID NO: 2.

21. The use of any of claims 15 to 20, wherein said mental disorder is selected from the group consisting of bipolar disorder, schizophrenia and depression.

22. The use of any of claims 15 to 20, wherein said mental disorder is bipolar disorder

23. A method of assessing the efficiency of a modulator of a KCNQ2 polypeptide for the treatment of a mental disorder, said method comprising administering said modulator to an animal model for said mental disorder; wherein a determination that said modulator

ameliorates a representative characteristic of said mental disorder in said animal model indicates that said modulator is a drug for the treatment of said mental disorder.

24. The method of claim 23, wherein said animal model is the STOP -/- mice with synaptic defects and severe behavioral disorders.

25. The method of claims 23 or 24, wherein said KCNQ2 polypeptide is a polypeptide of claims 1 or 2.

26. The method of any of claim 23 to 25, wherein said modulator specifically modulates a polypeptide comprising exon 15b shown at position 545 to 643 of SEQ ID NO: 2.

27. The method of any of claims 23 to 26, wherein said mental disorder is selected from the group consisting of bipolar disorder, schizophrenia and depression.

28. The method of any of claims 23 to 26, wherein said mental disorder is bipolar disorder.

29. Use of at least one KCNQ2-related biallelic marker for diagnosing whether an individual suffers from or is at risk of suffering from a mental disorder.

30. The use of claim 29, wherein said at least one KCNQ2-related biallelic marker is selected from the group consisting of 30-2/62 and 30-7/30 as depicted in table 3B and the complements thereof.

31. The use of claim 30, wherein the presence of a genotype "AG" at biallelic marker 30-2/62218 is indicative of said individual suffering from or being at risk of suffering from said mental disorder.

32. The use of claim 30, wherein the presence of a genotype " CC" at biallelic marker 30-7/30 is indicative of said individual suffering from or being at risk of suffering from said mental disorder.

33. Use of at least one KCNQ2-related biallelic marker for determining whether there is a significant association between said marker and a mental disorder.

34. The use of claim 33, wherein said at least one KCNQ2-related biallelic marker is selected from the group consisting of 30-2/62 and 30-7/30 as depicted in table 3B and the complements thereof.

35. The use of any of claims 29 to 34, wherein said mental disorder is selected from the group consisting of bipolar disorder, schizophrenia and depression.

36. The use of any of claims 29 to 34, wherein said mental disorder is bipolar disorder.

37. A method of genotyping comprising the step of determining the identity of a nucleotide at a KCNQ2-related biallelic marker or the complement thereof in a biological sample.

38. The method of claim 37, wherein said biological sample is derived from a single individual.

39. The method of claim 38, wherein the identity of the nucleotides at said biallelic marker is determined for both copies of said biallelic marker present in said individual's genome.

40. The method of any of claims 37 to 39, wherein said determining is performed by a microsequencing assay.

41. The method of any of claims 37 to 39, further comprising amplifying a portion of a sequence comprising the biallelic marker prior to said determining step.

42. The method of claim 41, wherein said amplifying is performed by PCR.

43. A method of diagnosing a mental disorder in an individual comprising the step of genotyping at least one KCNQ2-related biallelic marker according to the method of any of claims 38 to 42.

44. The method of claim 43 further comprising the step of correlating the result of the genotyping step with a risk of suffering from said mental disorder.

45. The method of claim 44, wherein said KCNQ2-related biallelic marker is selected from the group consisting of 30-2/62 and 30-7/30 as depicted in table 3B and the complements thereof.

46. The method of claim 45, wherein the presence of a genotype "AG" at biallelic marker 30-2/62218 is indicative of a risk of suffering from said mental disorder.

47. The method of claim 45, wherein the presence of a genotype " CC" at biallelic marker 30-7/30 is indicative of a risk of suffering from said mental disorder.

48. The method of any of claims 43 to 47, wherein said mental disorder is selected from the group consisting of bipolar disorder, schizophrenia and depression.

49. The method of any of claims 43 to 47, wherein said mental disorder is bipolar disorder.